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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/644,702	08/20/2003	Kai Roland Kriedte	Kriedte 4-1-2	6700

46900 7590 03/07/2007
MENDELSON & ASSOCIATES, P.C.
1500 JOHN F. KENNEDY BLVD., SUITE 405
PHILADELPHIA, PA 19102

EXAMINER

CORRIELUS, JEAN B

ART UNIT	PAPER NUMBER
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2611

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/644,702

Applicant(s)

KRIEDTE ET AL.

Examiner

Jean B. Corrielus

Art Unit

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25, 27 and 28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 27 and 28 is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-10, 12, 13, 15-18, 20-22, 24 is/are rejected.
- 7) ☒ Claim(s) 7, 11, 14, 19, 23 and 25 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. Applicant's response has overcome the objection to the specification.

Claim Objections

2. Applicant's response has overcome the objection to claims 1-14 and 16-26.

Claim Rejections - 35 USC § 112

3. Applicant's response has overcome the outstanding 112 rejection

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 3, 5-6, 9-10, 12, 13, 15, 17-18, 21, 22, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sehier US Patent No. 5,285,482 in view of Alamouti et al US patent publication No. US2004/0234003A1.

As per claim 1, Sehier et al discloses a timing recovery method and apparatus comprising receiving a plurality of signals (1); for each channels, estimating a CIR value using element 23 characterizing impulse response of the channel see col. 5, lines 19-20; summing the plurality of CIR values for the plurality of channels note col. 5, line 45 where the equation includes sum of CIRs ($\sum W_i$) and integrating the summed CIR values over a specified window again col. 5, col. 45, Sehier teaches summation or integration of the summed CIR from a window 0 to $q-1$; a symbol timing is determined from the

Art Unit: 2611

integrated summed see col. 5, lines 45-55 and processing the received signals based on the symbol timing using circuit 6. However, Sehier does not teach that the signals are received from a plurality of transmitter antenna. Alamouti et al discloses a receiver for receiving a plurality of signals from a plurality of transmitter antenna see fig. 4. Given that fact, it would have been obvious to one skill in the art to incorporate such a teaching in Sehier et al so as to be able to process signals from systems that use STTD encoding technique that generally employs at least two transmitting antennas. In addition, a transmitter created diversity would have allowed effective communication to be achieved between the receiver and the transmitter see Alamouti paragraph 0015.

As per claim 3, each value corresponds to power of the CIR see col. 5, line 5, that shows the W_i generated from a power of the parameters inside the absolute value symbol that corresponds to the CIR.

As per claim 5, as applied to claim 1 above, Sehier et al and Alamouti disclose every feature of the claimed invention do not explicitly the specified window is equal to the length of a guard interval of symbols in the received signals. It would have been obvious to one skill in the art to set the specified window equal to the length of a guard interval of symbols in the received signals in order to ensure that characteristics of the transmission channel are accurately determined.

As per claim 6, it would have been obvious to one skill in the art to set the specified window at a duration substantially equal to a maximum tolerable delay spread for the received signals and the motivation to do so would have been the same as provided above with respect to claim 5.

As per claim 9, Sehier does not explicitly teach that the plurality of channels corresponds to a single antenna of the receiver. Alamouti discloses that the plurality of channels corresponds to a single antenna of the receiver see fig. 3. It would have been obvious to one skill in the art to configure the receiver with a single receiving antenna and the motivation to do so would have been the same as provided above with respect to claim 1.

As per claim 10, it would have been obvious to one skill in the art to determine a different timing for each receiver antenna in order to reconstruct respective signal base on their respective symbol timing.

As per claim 12, Sehier does not explicitly teach the plurality of channels corresponds to all of the antennas of the receiver. Alamouti teaches the plurality of channels corresponds to all of the antennas of the receiver see fig. 4. Given that, it would have been obvious to one skill in the art to configure the receiver with a single receiving antenna and the motivation to do so would have been the same as provided above with respect to claim 1.

As per claim 13, a joint timing is determined at the output of circuit 29 for all receiver antennas see input of circuit 6. (Note that the limitations, recited in steps b-e, only repeat limitations previously included and addressed in base claim 1).

As per claim 15, see claim 1 above and in addition, Sehier teaches inherently a plurality of receiver antenna to receive each signal (1); a receiver branch for each different receiver antenna, each receiver branch having a transform adapted to transform a corresponding receiving signal into a plurality of transformed components

Art Unit: 2611

see for instance fig. 1, element 8; a symbol decoder see for instance (12 and 14) for receiving transform components, i.e., output of the adder 10, from each transform (note the summed output from adder 10 is a resultant signal from each transform 8); and processing within each receiver branch see fig. 1 is based on symbol timing determined for each receiver branch see the symbol timing provided to circuit 6 in each branch of fig. 1. However, Sehier does not teach that the signals are received from a plurality of transmitter antenna in a MIMO system. Alamouti et al discloses a receiver for receiving a plurality of signals from a plurality of transmitter antenna in a MIMO system see fig. 4. Given that fact, it would have been obvious to one skill in the art to incorporate such a teaching in Sehier et al so as to be able to process signals from systems that use STTD encoding technique that generally employs at least two transmitting antennas.

As per claim 17, see claim 5.

As per claim 18, see claim 6.

As per claim 21, see claim 9.

As per claim 22, see claim 10.

As per claim 24, see claim 13.

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sehier in view of Alamouti et al US patent publication No. US2004/0234003A1 and further in view of Li et al US PUB. No. US 2006/0209765 A1.

As per claim 2, as applied to claim 1 above, Sehier et al and Alamouti disclose every feature of the claimed invention do not explicitly teach the MIMO system is a

MIMO OFDM system. Li et al teaches MIMO system as a MIMO OFDM system, see abstract. Given that fact, it would have been obvious to one skill in the art to incorporate such a teaching in Sehier et al and Alamouti so as to provide compatibility to system that uses OFDM modulation scheme.

7. Claims 8 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sehier US Patent No. 5,285,482 in view of Alamouti et al US patent publication No. US2004/0234003A1 and further in view of Schmidl et al IEEE transaction on communications, Vol. 45, No. 12, December 1997, page 1613-1621.

As per claim 8, as applied to claim 1 above, Sehier et al and Alamouti disclose every feature of the claimed invention do not explicitly teach that the processing of the received signals includes generating a DFT for each received signal and wherein the DFT is based on the determined symbol timing. Schmidl et al teaches fig. 2, a processing of a received signal includes generating a DFT based on the determined symbol timing. Given that fact, it would have been obvious to one skill in the art to incorporate such a teaching in Sehier and Alamouti so as to enhance signal acquisition.

As per claim 20, see claim 8.

8. Claims 4 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sehier in view of Alamouti et al US patent publication No. US2004/0234003A1 in view of KOBYLINSKI et al US PUB. No. US 2004/0184568 A1.

As per claim 4, as applied to claim 1 above, Sehier et al and Alamouti discloses every feature of the claimed invention do not explicitly teach each CIR value is based on

Art Unit: 2611

a correlation between a corresponding received signal and a known training sequence. KOBYLINSKI et al teaches a CIR value is based on a correlation between a corresponding received signal and a known training sequence see paragraph 0056. Given that fact, it would have been obvious to one skill in the art to incorporate such a teaching in Sehier and Alamouti so as to provide accurate estimate of the transmission signal required to reconstruct the original signal.

As per claim 16, see claim 4, above and in addition, each value corresponds to power of the CIR see col. 5, line 5, that shows the W_i generated from a power of the parameters inside the absolute value symbol that corresponds to the CIR.

Allowable Subject Matter

9. Claims 7, 11, 14, 19, 23, and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. Claims 27 and 28 are allowed.

Response to Arguments

11. Applicant's arguments filed 1/29/07 have been fully considered but they are not persuasive. It is alleged that the examiner does not explain what an "STTD encoding technique" is. However it is noted that such an "encoding technique" is a well known term of art where information to be transmitted is encoded in both time and space. See for instance, US patent Publication No. 20040086065 paragraph 0019. It is the

Art Unit: 2611

applicant's position that the Sehier teachings and the Alamouti teaching are not combinable because Sehier teaches a transmitter that transmits on a single channel using a single antenna and a receiver that receives on a plurality of channels while Alamouti teaches transmitting and receiving signals on a plurality of channels. Examiner disagrees. As a preliminary matter, it is noted that Sehier does not teach the use of a **single antenna**. In other words, Sehier is silent about the number of antenna being used. Seheir only teaches at col. 2, lines 62-63, and col. 3, lines 47-48 that the transmitter transmits signals on over a dispersive path and relative to a diversity channel (i.e. using diversity technique). However, as evidence by Alamouti, "diversity technique" or diversity channel" can be created simply by using a plurality of transmit antennas (transmit diversity) and a plurality of received antennas (received diversity) see fig. 4. Given the teaching of Alamouti, one skill in the art would have been motivated to implement a multi-antenna element in the transmit section of Seheir so as to achieve effective communication between the transmitter and a receiver as taught by Alamouti see paragraph 0015. It is alleged that the integrated summed CIR value are generated from each channel estimator. However it is noted that that Sehier teaches per equation on line 30 of col. 5 that the timing estimator generates integrated summed CIR values. It is the applicant's position that Sehier does not teach a joint symbol timing to generate a single integrated summed CIR value. However, such limitation is not claim. For the sake of argument however note Seheir teaches that circuit 25 implementing equation in line 30 of col. 5 that shows the summed CIR being integrated jointly for all the channels of the received antennas.

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jean B. Corrielus whose telephone number is 571-272-3020.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2611

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Jean B Corrieus
Primary Examiner
Art Unit 2611

3-1-07